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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,935	08/23/2005	Michael Numminen	3670-55	4772

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EXAMINER

LIU, HARRY K

ART UNIT	PAPER NUMBER
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3662

MAIL DATE	DELIVERY MODE
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08/01/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/520,935	Applicant(s) NUMMINEN, MICHAEL	
	Examiner Harry Liu	Art Unit 3662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Receipt is acknowledged of applicant's amendment filed (06/12/2007). Claims (1-15) are pending and an action on the merits is as follows.

Applicant's arguments with respect to claims (1, 7 and 14) have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 7-10, 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robbins (5973638) in view of Fletcher (4119972).

Regarding claims 1, 7, 14, Robbins discloses a smart antenna/antenna array channel simulator and test system for verifying the integrity (calibrate) of a smart antenna system by extracting the temporal (different time intervals) and spatial information of the signals of interest (main lobe instead of grating lobe) (Abstract). The signals that are received on the different elements of the antenna array are combined (adding the value/sum)(see FIG. 8 below) to form a single output and the signal received over time at the different antenna elements of the array are weighted (column

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8, lines 25-27). Robbins discloses using computer program (the software or processor for controlling) (column 28, lines 9-15)

Robbins does not specifically disclose the method of saving the radiation diagram at t_1 and t_2 ; switching off one element at a time and keeping the ends remain, it is known for people skilled in the art that weighting is a method of combining (summing) gain, phase and time interval (for multipath purposes) from all array elements by reducing /turning off some elements based on weight. Plus, Fletcher teaches turning off antenna element (column 7, lines 27-32). It would have been obvious to modify Robbins by Fletcher by taking radiation diagrams from different time intervals (t_1 and t_2); turning off (or reducing) one array at a time (which is in between ends falling on side lobes) in order to get an antenna system that is capable of receiving signals more from main lobe instead of side lobes and capable of finding the maximum distance between element without seeing grating lobes.

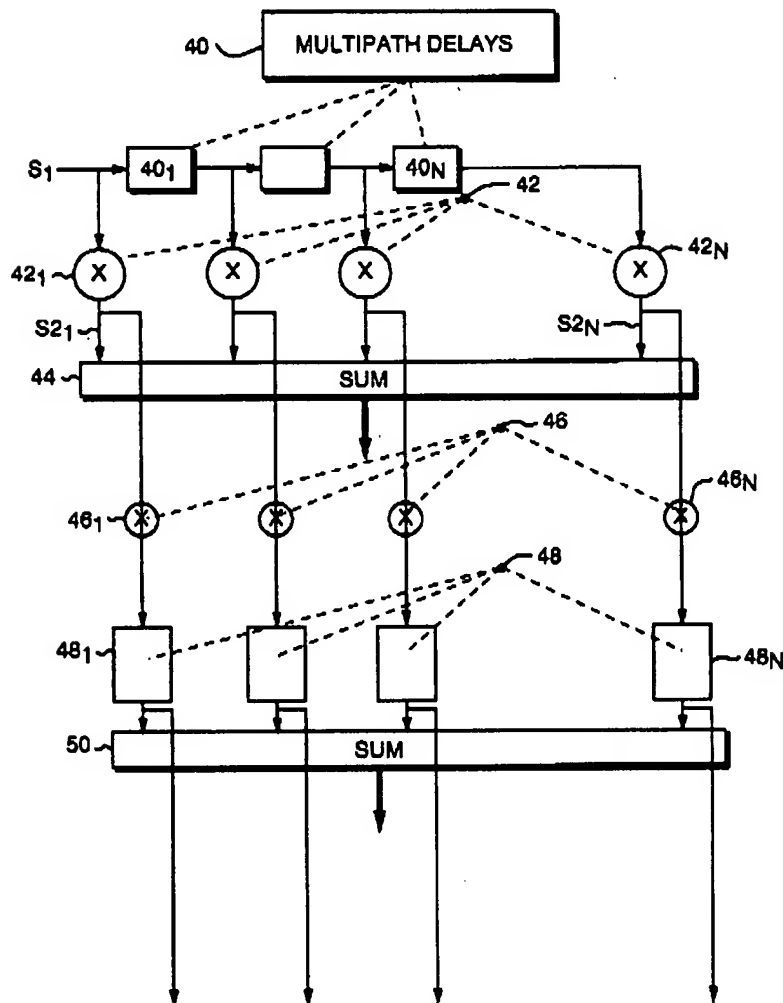


FIG. 8

Regarding claims 2,8,15, Robbins as modified by Fletcher discloses turning off antenna elements to achieve sidelobes suppression purpose and finding maximum range (angle) between beams. It would have been obvious turn off antenna element one by one until only two outermost element active in order to find the maximum angle while not skipping any potential maximum angle found.

Regarding claims 3, 4, 9, 10, Robbins discloses the direction in which the array has maximum response is said to be the beam pointing direction. Thus, this is the

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direction in which the array has maximum gain (column 7, lines 15-25). This is finding the maximum point for the corresponding angle on main lobe. The A/D converter for converting analog to digital is used (see Fig. 9A below) for converting analog signals to digital signals.

Regarding claims 12, 13, Robbins as modified by Fletcher discloses sidelobes suppression finding maximum range (angle) between beams. It would have been obvious to use this for finding direction of arrival since finding maximum magnitude between maximum angles has achieved.

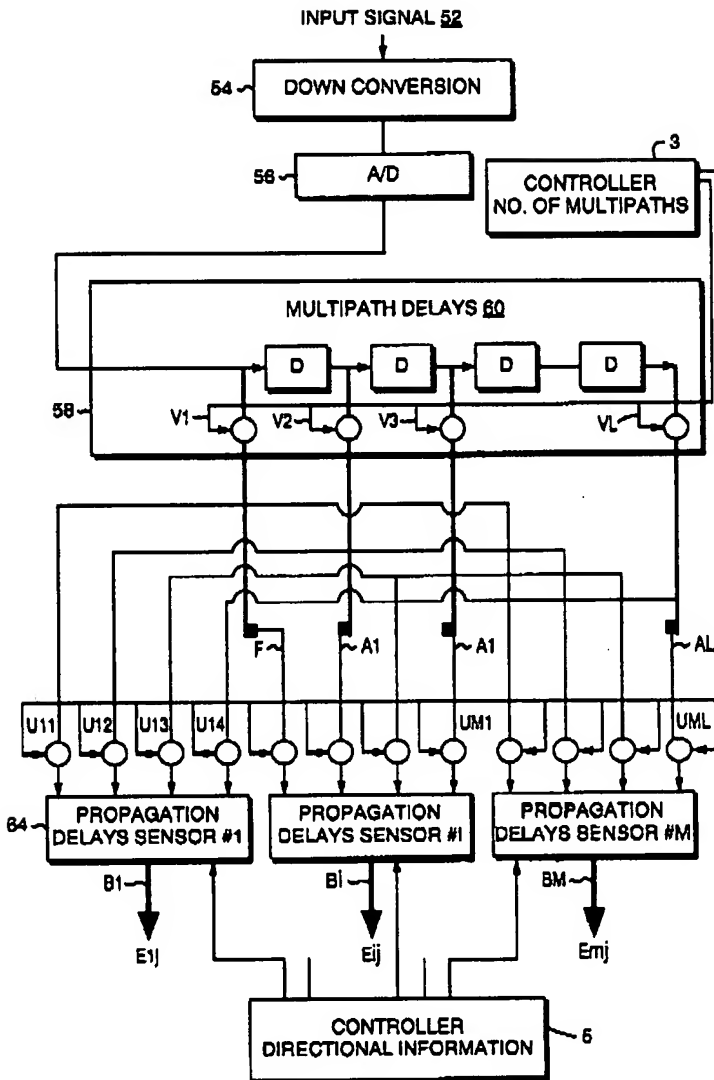


FIG. 9A

3. Claims 5-6, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robbins (5973638) in view of Fletcher (4119972), as applied to claims 1& 7, and further in view of Derneryd (6351243).

Regarding claims 5-6, 11, Robbins as modified by Fletcher as applied to claims 1 & 7 rejection above, discloses all claim limitation except for producing a radiation

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diagram from distance between elements is wavelength divided by two and the angle is between $-\pi/2$ and $\pi/2$.

However, Derneryd teaches a sparse array antenna with sparse element grid in a one-dimensional scanned array or multi-beam array for finding the distance between elements in order to generate no grating lobe (Abstract). And the element separation needs to be reduced to half a wavelength or less to avoid generating grating lobes within visible space (column 1, lines 28-30). It is known for people skilled in the art that directional antenna pattern/diagram is always shown with only 180 degrees for the front lobe gain, choosing between $(-\pi/2$ and $\pi/2)$ or (0 to 180 degrees) as angle reference is a common technique. It would have been obvious to further modify Robbins invention by producing radiation diagram from the value (amplitude) at corresponding angle and the distance between elements with no grating lobe with element distance less than half of wavelength in order to get an array antenna system that is capable of accurately radiates/receives signals while reducing undesired grating lobes.

Response to Arguments

Applicant argues for claims 1, 7 and 14 that neither U.S. Patent neither 5973638 nor 6351243 discloses/teaches turning antenna element off. A new reference by Fletcher has been applied to respond to this specific argument.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Liu whose telephone number is 571-270-1338. The examiner can normally be reached on Monday -Thursday and every other Friday..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-270-2338.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Harry Liu
Examiner
Art Unit 3662
July 21, 2007



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